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This curriculum guide, encompassing a total industrial arts and vocational program for grades K-12 for the Leflore County Schools, Greenwood, Mississippi, was developed by a local staff of educators. Special emphasis is given to industrial arts in grades K-6, vocational orientation in the seventh grade, introduction to modern industry in the ninth grade, and vocational part-time cooperative education in the 12th grade. Major divisions include: (1) Introduction, (2) Elementary Industrial Arts (K-6), (3) Junior High School Industrial Arts, (4) Industrial Arts and Vocational Education in High Schools, and (5) Summary and Recommendations. Appended materials include a pilot proposal for Elementary School, Course descriptions and outlines for Elementary School Industrial Arts, and a report on "Interpretation of Modern Industry." (GR)

Final Report

INDUSTRIAL ARTS

and

VOCATIONAL EDUCATION

in

GRADES K-12

Leflore County Schools

Greenwood, Mississippi

October - 1968

FOREWORD

The Leflore County School System is moving forward under the able leadership of Superintendent Otis W. Allen and his capable staff. Outstanding characteristics of this staff are a full recognition of the educational needs of Leflore County and a willingness to experiment and innovate to the extent necessary to meet these needs.

An administration of this kind produces an environment which is extremely conducive to progress and which serves to encourage innovative thinking and doing on the part of staff members and teachers. The resulting team effort and attitude is a necessary prelude to the development of an educational program which will meet the unique needs of the young people of Leflore County. Such an environment also produces a willingness on the part of teachers to accept new ideas and to put them into practice.

It is in this setting that the study described in the following pages was made. The assignment was to develop a total industrial arts and vocational education program for grades K-12 for the Leflore County Schools.

The reader is invited to examine very carefully the content of the report with special attention being given to industrial arts in grades K-6, vocational orientation in the seventh grade, introduction to modern industry in the ninth grade, and vocational part-time cooperative education in the

twelfth grade. These segments of the program are innovative in nature and merit special attention and nurture on the part of those responsible for leadership.

A word of caution is offered regarding administrative expectations during the formative stages. "Patience" and "encouragement" are key words during this period. It must be kept in mind that the faculty of the elementary schools is accepting the challenge to supplement conventional methodology in which it is well versed, with new teaching concepts in which it has had little or no experience or training. It necessarily follows that success and quality will depend upon administrative ability to maintain an environment which will feature patience in its expectations and encouragement to teachers as they fail or succeed in playing their part in the development of the total program. Such an environment will include ample opportunity for teachers to correct their deficiencies through in-service workshops and extension courses which can be made available to them.

The young people of Leflore County who experience this program from kindergarten through the high school should be able to fully adjust to the environment into which they will emerge and to employment opportunities which will be available to them in the agricultural, business, industrial and professional segments of the economy.

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ACKNOWLEDGMENTS

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Resource Persons

Special acknowledgment is extended to Miss Elizabeth E. Hunt, Director of the "Technology for Children Project", State Department of Education, Trenton, New Jersey, and to Dr. F. Dale Houston, Assistant Professor of Elementary Education, Mississippi State University, for their contributions to the Elementary School Industrial Arts area of the study.

Acknowledgment is also extended to Mr. J. W. Lewis, State Supervisor for Trade and Industrial Education and Mr. Larry Godfrey, State Supervisor for Industrial Arts of the State Department of Vocational Education, Jackson, Mississippi, for their helpful suggestions and critical evaluation of the study in the junior and senior high school areas.

Appreciation is expressed to Mr. Charles W. Roye, Director of Industrial Arts and Vocational Education, and Mr. James Obannon, Elementary School Industrial Arts

Consultant of the Leflore County Schools, for their assistance in coordinating the activities of the study with the Leflore County School System.

Appreciation is also expressed to Mr. Otis W. Allen, Superintendent, Leflore County Schools, and Mr. Cooper W. Crain, Coordinator, Title III, for their wholehearted cooperation throughout the study.

TABLE OF CONTENTS

C H A P T E R I

INTRODUCTION

In developing a total industrial education program for the Leflore County School System, many questions were raised for consideration. Some of these questions were:

1. What are the educational needs of the student body?
2. How can teachers and supportative staff most effectively convey concepts concerning industrial education objectives to their students?
3. How can existing industrial education facilities best be utilized?

It is the responsibility of industrial education—as well as every other discipline—to develop basic concepts which will contribute to the development of desirable attitudes through behavioral changes. An important psychological consideration is to instill in each student a desire for individual worth and dignity. The student must learn that a person does not attain an acceptable status in our democratic society without putting forth the necessary effort. If this concept is developed at an early age, together with a positive attitude toward learning, the holding power of the school should increase. The final result should be an individual who will understand that the measure of success achieved depends greatly upon his attitude, ability, and determined quest for knowledge.

In the elementary school, exploration of the world of work should be broad and general in nature. The four great employment areas of business, industry, agriculture, and the professions should be explored. The young student may have some definite ideas about three of these four areas. He becomes exposed to business through home budgeting and visitation of retail outlet stores. His knowledge of modern agriculture may be limited; however, he will have had some exposure to this employment area through his agrarian environment. His introduction to the professions may have come through his association with school personnel and medical doctors. On the other hand, the students' orientation to the industrial world of work may be limited to a casual view of the external walls of an industrial plant as he rides by.

Because of the student's lack of knowledge about industry, the major objectives of this project were directed toward a progressive orientation to the industrial world of work. In the elementary school the orientation is to be introductory and in the junior high school it should be exploratory and pre-vocational. In the high school the student exposure to industry should be general or vocational in nature (see Figure 1, page 40).

Just as there is no place in the school curriculum for a poor social studies or math program, there is no justification for the operation of a second-rate industrial education program. Therefore, administrators, teachers, and pupils alike should understand that all students involved in a

concentration of industrial arts and vocational education classes are doing so for a definite purpose. These classes should not be misused because their purpose is to alleviate some definite problems resulting from a changing agrarian economy.

Basic Justification

The following is a basic justification for a total industrial arts and vocational education program in the Leflore County School System.

Cultural and Economic Deprivation

American society in its rapid development has by-passed large segments of the population. These individuals are bound in poverty and cultural deprivation because they do not possess the knowledge and skills demanded by today's technological economy. The mechanization of industry and agriculture has created a plethora of opportunity for the educated individual but has little to offer the unschooled. The Mississippi Delta, traditionally an agricultural area, no longer needs uneducated farm labor. Leflore County schools are now faced with the problem of providing an education that will prepare these displaced individuals to be productive, self-respecting, self-supporting citizens.

High Dropout Rate

The Leflore County School System experiences a high

dropout rate beginning in the elementary schools. It is believed that this is largely due to a lack of understanding concerning the educational requirements necessary for occupational entry into today's technological society.

Public schools are charged with the responsibility of developing in each student the concepts and attitudes which will guide them through lives that are satisfying to the individual and beneficial to society. To fulfill this responsibility, schools must offer programs which are realistic and meaningful to students and that will hold the students in school. Programs with this holding power must provide for an introduction to today's technological society and the opportunity to explore its many ramifications.

Providing Personnel for Industry, Agriculture, and Business

Traditionally, Leflore County has been sustained by an agricultural economy. Agriculture still plays a predominant role but the economic structure of the county has expanded to include a substantial number of business and industrial establishments. Due to a combination of factors, the county school system must find ways to provide an educational program which will produce personnel who are attractive to industry, agriculture, and business.

Sweeping technological developments have brought about the mechanization of agriculture. This has greatly reduced the demand for unskilled farm labor and increased the need

for technically-trained farm personnel. This reduction in the need for unskilled farm labor has eliminated one of the major sources of employment for Leflore County residents.

The minimum wage law has also served to reduce the size of the agricultural work force. It is agreed that there is a need for equitable wages but this increase in hourly pay rate has caused the agricultural industry to seek more efficient modes of operation. Improved efficiency often means a reduction in the need for unskilled labor. This factor has also added to the necessity of providing educational opportunities for displaced personnel.

Increased industrial and business activity in the Mississippi Delta and throughout the southern states provides a means of alleviating the conditions of unemployment caused by America's advancing technological society. These advances in economic development, including mechanized agriculture, require competent, well-qualified employees. The county schools must rise to the need and provide an educational program which will enable its charges to effectively participate in the production, processing, distribution and consumption of the vast product of American technology.

General Purposes

The overall purpose of this project is to develop an industrial arts and vocational education program for grades K-12 which will effectively prepare people for living and working in a modernized agricultural and industrial economy.

K-6

In K-6 the purpose of the program is to introduce and explore the world of work through an integrated industrial arts approach. This will be accomplished through the combined effort of all elementary teachers, elementary industrial arts specialists, and guidance counselors.

Junior High

The purpose of junior high school industrial arts is to develop an understanding and appreciation of modern industry—its materials, methods, processes—and its place in our technical society. This can be accomplished through the use of tools and machines in the processing of industrial materials. These industrial arts activities in grades seven, eight, and nine will be strongly directed toward pre-vocational orientations. This will be accomplished through the combined effort of the industrial arts supervisor, industrial arts teachers, and guidance counselors.

Senior High

The senior high school industrial education program has a two-fold purpose. It must serve both the vocational and general education needs of the students.

The purpose of the vocational program will be to provide an opportunity for the development of skills and the acquisition of technical knowledge which will prepare an

individual for successful entrance into and progress in an occupation of his choice. This will be accomplished by participation in skills development courses. These courses should be established on the basis of an occupational survey conducted in Leflore County which will identify existing and potential employment opportunities.

Vocational education can be given successfully only to those who need, want, and are capable of profiting from the experience. Therefore, occupational choice should be based upon acceptable guidance procedures.

Industrial arts should be provided for those high school students who do not desire or cannot profit from vocational education. This program will be a means of continuing and expanding an understanding of the industrial world of work. The following classification of students as outlined in A Guide to Improving Instruction in Industrial Arts[1] will be served:

1. Students who wish to explore more deeply the educational, cultural, and consumer aspects of American industry.
2. Students planning to pursue advanced study and careers in areas such as applied and technical sciences.

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[1] A Guide to Improving Instruction in Industrial Arts, AVA, 1968, pp. 13-14.

Adult Education

Although the designated purpose of this proposal does not encompass the training and retraining needs of employed adults, this important phase of vocational education should continue to receive high priority.

C H A P T E R I I

ELEMENTARY INDUSTRIAL ARTS IN LEFLORE COUNTY SCHOOLS (K-6)

Overall Purpose

The general purpose of industrial arts in the elementary grades is to help the school do better what it is already doing. It must not be considered as an additional course but rather as supplementary activities involving the use of industrial tools and materials which will enrich the teaching process and provide strong pupil motivation to learning. Nor should it be considered just as a matter of making things. All projects or construction activities should stem from that which is being taught as a regular part of the curriculum and should be designed to bring to life some aspect of the content which would otherwise be left to the imagination of the pupil (see Figure 1, page 40). All projects and activities should be designed at levels capable of accomplishment by the age group in question and should provide for successful participation and accomplishment by each pupil in accord with his ability level. The richness of the program will depend upon the initiative and ingenuity of the teacher and his desire to be innovative.

The following list of values describes the program in more detail:

1. Reduces the level of abstraction
2. Involves more of the senses in the learning process
3. Provides more fully for individual differences
4. Motivates learning
5. Provides outlets for inate desires to create
6. Helps establish learning readiness
7. Makes school a more pleasant experience
8. Introduces pupil to the world of work
9. Acquaints pupil with the care and use of common industrial tools and materials
10. Produces an environment which is conducive to the development of desirable social habits and personality characteristics
11. Produces tangible results from pupil effort
12. Provides opportunity for all levels of pupil success in accord with individual differences
13. Gives the child an objective medium for expressing his ideas
14. Provides the child with a manipulative form of creative leisure-time expression.

General Purposes for Grade Levels

Kindergarten. As a child reaches this age, he is seldom satisfied with fictitious relationships between his thinking and his creative work. He would like to establish a "real" relationship. In undertaking a study such as this, a primary purpose would be to help each child find and

establish real relationships between his thinking and his industrial arts activities.

Grades 1, 2, 3. During this period individual children become more conscious of reality as they attempt to improve relationships between their creative work and whatever it is these works represent. They have become more aware of their environment through the many experiences to which they have been exposed and their need for self-assurance often becomes a guiding factor in whatever they attempt. A principal purpose during these grades would be to provide opportunities which would allow each child to pursue his own search for self-assurance through industrial arts activities.

Grades, 4, 5, 6. During this important period of development, children actually lay the ground-work for their ability to work in groups and cooperate as functioning members of our society. During these grades it becomes necessary that in the industrial arts activities as in other activities, the curriculum should be geared to promote and enhance children's desires and needs for group participation.

The Consultant

The industrial arts consultant is a vital factor in the success of the program. His primary responsibility and function are described as follows:

1. He must be a leader and must also be sensitive to leadership abilities of the teachers. He should be able to avoid negative attitudes.

2. He should encourage teachers to share ideas with one another.
3. He must teach teachers.
4. He must be an immediately available consultant to all teachers.
5. He must promote the total program.
6. He must initiate and maintain good public relations activities directed toward in-school and out-of-school publics.
7. He should be responsible for tool maintenance.
8. He should serve a maximum of 20-25 classrooms.
9. He must be well versed relative to elementary education and industrial arts.
10. He should have space for office and tool and material storage.

Laboratory and material storage space should be available separate and apart from the industrial arts shop. This space should be available to teachers for work and experimentation and for use by classes involved in projects which cannot be carried out in the classroom. If this is not possible, central material storage should be provided in the industrial arts laboratory. When elementary students become engaged in activities involving materials housed in central storage, the teacher should encourage them to develop a bill of materials. The consultant should be responsible for the procurement of these materials. This will minimize disruption of activities in the industrial arts laboratory.

The total success of the program depends on:

1. The degree to which the consultant successfully functions in the above categories.
2. The degree to which the faculty and administration understands and accepts the purposes and values of the program.
3. The degree to which the administration and faculty are willing to make appropriate activities an integral part of the teaching program.
4. The degree to which parents understand and accept program purposes and values and encourage pupils in their work.

Suggested Activities for K-6

Since industrial arts activities should grow out of the curriculum, it is not feasible to prescribe specific activities. For a sample listing of activities, refer to pages 89-94 in Industrial Arts for Grades K-6.[1] This list is presented only to illustrate activities which children and teachers have carried on successfully. Furthermore, these activities should tend to stimulate other ideas, since no such list could be all-inclusive.

The many activities and concepts listed in this reference should be coordinated between the various grade levels.

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[1]Gerbracht, Carl, and Babcock, R. J. Industrial Arts for Grades K-6. Bruce Publishing Company, Milwaukee, 1959.

The level of pupil involvement should increase as the child progresses through grades 1-6. For example, in the first grade, the student may be introduced to the name and general use of combination pliers which is a tool commonly found in homes. However, by the time he has completed the sixth grade, his knowledge of these tools should have been expanded to include the proper name, care and safe use of a variety of pliers.

Furthermore, some basic learning experiences involving tools and materials should be repeated at each grade level. Examples of these are as follows:

1. Planning the activity
2. Making bill of material
3. Determining proper sequence of procedures to successfully complete the activity
4. Listing tools necessary to successfully complete the activity.

The acquisition of industrial skills and knowledge is not the paramount objective of industrial arts in the elementary school. It should be kept in mind, however, that varying degrees of both skill and knowledge should be acquired, depending upon the aptitudes and interests of individual students and the appropriateness and intensity of the experiences to which they are subjected. The following chart will be indicative of the range of the skill and knowledge which could be reasonably expected.

Skills the Pupil Should Learn to Perform	What the Pupil Should Know
1. Use try square in making at right angles to straight edge.	1. Name care and use of tools.
2. Use of C clamp.	2. Difference between hard and soft wood.
3. Sawing across grain.	3. How to perform good housekeeping practices.
4. Ripping.	4. Safety precautions in the use of all tools and equipment.
5. Use of mitre box and back saw.	5. How to select proper size nails.
6. Drilling holes in wood.	6. How to work and share with others.
7. File curved edges.	7. The importance of proper storage of tools when not in use.
8. Driving and pulling nails with claw hammer.	8. Importance of accuracy.
9. Smoothing with sandpaper.	9. The importance and dignity of work.
10. Use of paint brush with water, paint, and shellac.	10. Relationship of classroom activities to the world of work.
11. Application of stain.	11. Basic mathematical and scientific principles involved in construction activities.
12. Use of scale-measuring in even inches.	
13. Sawing with keyhole saw.	
14. Planing edges with block plane.	
15. Using combination pliers.	
16. Use of coping saw.	
17. Use of screw driver and screws.	
18. Use of glue.	
19. Clean paint brushes.	

Tools for Classroom Use

If industrial arts activities are to become an integral part of the elementary curriculum, certain basic handtools must be available in each classroom. Furthermore, the use of these tools must be a pleasant experience for both teachers and students. Consequently, these tools must be kept in good condition at all times. They should be attractively mounted and displayed so the student will consider them an integral part of the classroom (see Elementary Classroom Floor Plan in Appendix A).

The following list of tools and furniture is recommended as a minimum requirement for each classroom.

Quantity	Description*	Unit Cost	Total Cost
2	5" C clamps	$ 2.50	$ 5.00
2	10 and 12 oz. wood handle claw hammers	5.60	11.20
1	Wooden or rubber mallet	1.80	1.80
1	10" second cut mill file with handle	1.00	1.00
1	File, Type-Surform, No. 295	2.70	2.70
1	File, Round-Surform, No. 297	2.25	2.25
1	Block plane, Stanley No. 118	6.75	6.75
1	6" side cutting pliers No. 38306	3.50	3.50
1	5" combination pliers No. L25	1.60	1.60
1	Steel bench rule, 2', No. 62	5.10	5.10
1	10" backsaw	6.10	6.10
3	Coping saws and extra blades	.85	2.55
1	10-point, 20" crosscut saw	5.20	5.20
1	2½" plastic-handled screw driver	1.55	1.55
1	4" plastic-handled screw driver	1.95	1.95
1	6" Phillips screw driver	.85	.85
1	10" Aviation tin snips	6.00	6.00
1	6" try square	2.70	2.70
1	12" combination square	3.60	3.60

*Keyed to Brodhead-Garrett catalogue.

Quantity	Description	Unit Cost	Total Cost
1	Yardstick	NC	NC
1	1/4" portable electric drill	$18.00	$18.00
1	1/16" to 1/4" high-speed steel drill set	5.60	5.60
1	Speedbor space type wood bits, set 3/8" to 1"	4.95	4.95
1	6" adjustable wrench	2.15	2.15
	SUBTOTAL		$102.00
1	3/4" x 4' x 5' plywood worktop with 24" support to be constructed locally	8.00	8.00
2	Clamp-on carpenter's vises	3.66	7.32
1	3/4" x 4' x 3' plywood open tool panel to be constructed locally and mounted on wall (see Appendix A). Designed with custom holders to house recommended tool list. (One 4' x 8' sheet of 3/4" plywood will make one worktop and one tool panel.)		
4	4" long sawhorses (Two 22" high and two 24" high). Legs to be constructed of 1 x 6 pine set at 22 degree angle. (See page 13 of Point of View Elementary Industrial Arts by Stanley Tools, Educational Department, New Britain, Conn.)	2.00	8.00
			$128.32

Note: Worktop, sawhorses and tool panel should be stained and varnished for uniform appearance.

In recognition of the cost involved in equiping each elementary classroom, the list of recommended tools was held to a minimum. Additional tools would be helpful in carrying out the objectives set forth in this document. They are listed in order of priority.

Vibrating jig saw
Extension cord
Hacksaw
#403 drill points
Nail set
Center punch
Counter sink
Sloyd knife
File card
Framing square.

Materials for Classroom Use

Handwork requires a variety of inexpensive construction materials. It would be difficult to list all possible materials that could be utilized in the elementary classroom. One of the objectives of this project is for children to solve problems they encounter. Therefore, the ingenuity of student and teacher are the only limitations to possible material selection.

The following list is suggestive of locally available materials which can be obtained at a nominal cost.

It is suggested that all materials preceeded by an asterick(*) be housed in the classroom and the remainder be kept in central storage.

Hardware

Hinges, loose pin, various sizes

Screw eyes, various sizes

Cup hooks, various sizes

Square benthooks, various sizes

Corner braces

Tape - friction, plastic electricians, masking

Contact cement

Rubber cement

Bolts - machine and stone with nuts

Washers, assorted

*Finishing nails - assortment

*Common nails - assortment

*Wire nails - assortment

*Brads - assortment

*Screws - flathead and roundhead - assortment

*Scotch fastener

*White casein glue (all purpose)

Lumber

No. 2 common pine - 1 x 2, 1 x 4

Mahogany, sugar pine, fir or other softwood

Masonite or hardboard - 1/8" x 4' x 8'

Pegboard - 1/8" x 4' x 8'

Homasote - 1/2" x 4' x 8'

Upson Board - 1/4" x 4' x 8'

Dowel rods - assorted 3' lengths (1/16" - 1")

Interior plywood - 1/4" x 4' x 8'; 1/2" x 4' x 8'

Finishing Supplies

Latex paint

Paint thinner

Paint brushes (one inch)

Artist brushes

Garnet sandpaper - medium and fine

Steel wool

Deft, natural finish

Lacquer thinner

Mahogany stain

Implementation of Pilot Proposal

To successfully implement the elementary industrial arts program in Leflore County, it was decided that a pilot study involving only one school would logically be the first step (see Pilot Proposal in Appendix B). Phase one of this proposal was accomplished during the Leflore County pre-school workshop. This phase was initiated by presentation on the value of industrial arts in elementary schools and was concluded by the project staff during a three-day workshop. Phase two will be comprised of a graduate credit extension course.

Phase One

The philosophical basis for industrial arts in the elementary school was presented to the entire Leflore County faculty. (This presentation included slides and a film which were developed by Miss Elizabeth E. Hunt while she was director of the Technology for Children Project, State Department of Education, New Jersey.)

This general presentation was followed by a session with the pilot school faculty. The session consisted of a question and answer period and an introduction to the "design way of thinking" which is a problem-solving

technique (see Report by Miss Hunt in Appendix C).

Following this introductory presentation, the project staff participated in a three-day workshop with the elementary teachers in the Wilkes School. (The Wilkes School at Money, Mississippi, was selected for the pilot project.) The major purposes of this workshop were:

1. To introduce the teachers to the use and care of basic industrial tools and materials.
2. To initiate thinking about ways of incorporating the use of industrial tools and materials in teaching elementary subjects (see Appendix D for In-Service Workshop Schedule of Events).

Demonstrations involving the use of tools and materials were given by the project staff and the elementary industrial arts consultant. Teachers received instruction in the use of these tools and materials through the construction of a project (see Appendix E for Project Plan Sheet).

During seminar sessions the teachers discussed ways in which they could use industrial arts activities to enrich their teaching in the elementary school. This concept was enthusiastically accepted by the group and numerous ways of accomplishing this integration were developed.

Phase Two

Phase two of the pilot project will be initiated through a graduate extension course which will be offered during the 1968 Fall Semester (see Appendix F for Course

Description).

It is believed that this course will contribute to the implementation of the objectives of elementary industrial arts as set forth in the course outline (see Appendix G).

Program Expansion

Industrial arts activities should eventually permeate the curricula of all elementary schools in Leflore County. This expansion would be feasible from the standpoint of Mississippi State University staff requirements if it took place at the rate of two schools per year. This would allow sufficient time for each elementary teacher to progress through phase one and phase two before being asked to introduce industrial arts activities into the elementary curriculum. This time schedule would also allow for the purchase of tools, the building of needed furniture, and the maximum efficiency of the elementary industrial arts consultant's efforts.

C H A P T E R I I I

JUNIOR HIGH SCHOOL INDUSTRIAL ARTS IN LEFLORE COUNTY SCHOOLS

Overall Purpose

One of the prime functions of the junior high school is to provide students with educational experiences which are exploratory and pre-vocational in nature. Industrial arts at this level should reflect this important charge. "The junior high school industrial arts program is the most diversified of all (industrial arts programs) and offers a variety of experiences in organized laboratories."[1] This program should provide exploratory experiences leading to a richer understanding of the tools, materials, processes, problems, and products of industry. These experiences should be oriented toward providing broad exposure to the many facets of today's industrial world of work. "The program includes opportunity for . . . planning, experimenting, and working in the major activities of industrial arts. Opportunities to study the underlying functions of industry and to explore their inter-relationship are all part of the total program."[2]

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[1] A Guide to Improving Instruction in Industrial Arts, AVA, 1968, p. 12.

[2] Ibid., p. 13.

The traditional "project-centered" industrial arts approach no longer depicts or relates effectively to modern industry. This approach is based on the concept of industry as it existed in the late 1800's and early 1900's. Industrial arts cannot accomplish its important pre-vocational and exploratory functions if it does not adequately convey the modern concept of industry.

The following objectives should be used as guidelines for developing junior high school industrial arts programs.

1. To provide all students with the opportunity to explore industry and the world of work.
2. To provide opportunities for attaining knowledge of industrial vocations and related avocational pursuits.
3. To improve the competence level of the students in regard to choosing, buying, and using the goods and services of industry.[3]

General Purposes for Grade Levels

Occupational Orientation

Occupational Orientation should be an integral part of the junior high school industrial arts program. This segment of the total program should provide exploratory experiences which would enable students to make wiser and more satisfactory occupational choices. A thirty-day block

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[3] Ibid., p. 13.

of time could be devoted to this pursuit in the 7th grade (see Figure 2, page 41). Additional time may be devoted to occupational orientation at the 8th and 9th grade levels.

These exploratory experiences would be under the direction of the industrial arts teacher. It would be his responsibility to organize and coordinate these activities. A major responsibility would be to obtain resource persons from the school, community, county or state who could adequately present the requirements and advantages of the occupational areas selected for study.

Grade 7. Industrial arts activities in the 7th grade should consist of the exploration of industrial crafts. These exploratory experiences should be conducted in multi-field industrial laboratories (composite general shops). The areas selected for study should represent industrial crafts which are of significant importance to the society they support. The craft areas selected for study should be expanded to provide students with a complete understanding of the industrial importance of the materials involved.

The following areas are representative of those suitable for inclusion in the 7th grade industrial arts program.

1. Ceramics
2. Plastics
3. Graphic arts
4. Soft woods
5. Non-ferrous metals.

The inclusion of both boys and girls in 7th grade industrial arts will make it mandatory to provide occupational orientation that is of interest to both groups. The following occupations are recommended.

1. Business and Office Education
2. Distributive Education
3. Home Economics
4. Health Occupations
5. Teaching

Grade 8. Industrial arts in the 8th grade should be devoted to exploration of the major modern industries. These experiences should provide students with a pre-vocational orientation to the industrial world of work. Multi-field industrial laboratories (composite general shops) should be used for these activities. The following areas are recommended for the 8th grade industrial arts program.

1. Forest Product Industries
2. Drafting
3. Metals
4. Electricity
5. Power

Occupational orientation can be expanded during the 8th grade. Industrial arts at this level is not required for girls but should be available on an optional basis. Since industrial arts is not required of girls, occupational orientation should be strongly directed toward occupations which are of primary interest to boys. The following

occupations are recommended:

1. Vocational Agriculture
2. Trade and Industrial Education
3. Engineering
4. Law

Grade 9. Industrial arts on the 9th grade level should have a two-fold purpose.

1. The first semester should be devoted to an in-depth study of two of the fields explored during the 8th grade.
2. The second semester should be directed toward the exploration of all facets of manufacturing industries and the nature of their inter-relationships.

During the first semester, opportunity should be provided for an in-depth exploration of two of the industrial areas studied during the 8th grade. The areas selected should represent the most prominent industries in the service area of the school. It is strongly suggested that the areas of electricity and power be considered.

Industrial arts activities recommended for the 9th grade should be conducted in multi-field industrial laboratories (composite general shops). No special equipment is necessary to conduct these activities. However, it is recommended that the facilities be upgraded if they do not adequately represent modern industry. Special attention should be given to the purchasing of equipment for those areas which are not presently being taught (example: power).

During the second semester, the exploration of the inter-relationships of the various facets of industry should be accomplished through the organization and operation of a mock or simulated company. The primary purposes of this simulated activity should be to develop a workable and meaningful knowledge of industrial organization, tooling, standardization, automation, and mass production, and to acquaint the student with the socio-economic impact of industry upon our society. This will provide the students with a meaningful interpretation of modern industry (see Appendix H, Chapter V of NDEA Report—Interpretation of Modern Industry).

Most contemporary industrial arts teacher education programs have not developed curriculums which provide teachers with the knowledge necessary to direct the organization and operation of a simulated company. An institute for the purpose of upgrading the knowledge of industrial arts teachers in this vital area was held at Mississippi State University during the summer of 1968. It has been proposed that a similar institute be held during the summer of 1969. Special provisions have been made for the inclusion of Leflore County industrial arts teachers and supervisors in this institute (see Appendix I, Addendum to Proposal No. 000076).

Consideration should be given to upgrading the industrial arts teachers' knowledge of modern industry. Institute participation described in Appendix I would help meet this need. Teacher improvement in specific subject matter areas

such as electricity-electronics, power, and metals is also necessary. It is recommended that in-service education designed to eliminate these deficiencies be conducted in Leflore County. Instruction might be provided by local personnel and/or by Mississippi State University personnel who are specialists in the subject matter areas in question.

Occupational orientation in the 9th grade should be devoted to exploring occupations directly connected with the organization and administration of industries. This would be in line with the introduction to modern industry offered during the second semester. The following areas are recommended:

1. Industrial Management
2. Industrial Technology
3. Industrial Economics.

C H A P T E R I V

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION IN LEFLORE COUNTY HIGH SCHOOLS (GRADES 10-11-12)

Overall Purpose

If the total vocational and industrial arts program in the Leflore County Schools is to be consistent and progressive, the high school must provide opportunity for all pupils to pursue and satisfy vocational interests which may have been discovered and/or inspired through exploratory and pre-vocational experiences in the elementary and junior high school programs.

The specific purpose of all vocational programs is to prepare individuals for successful entrance into and progress in a chosen occupation. If this purpose is to be accomplished, certain definite principles must constitute the frame-work upon which the vocational program is developed. The most important of these principles follow:

1. All day trade programs included in the 11th and 12th grades should be established on the basis of need which can be identified in terms of employment opportunity for program graduates. Vocational education programs lose their meaning, value, and justification if employment opportunity is not available to those who complete the training.

2. Vocational education can successfully be given only to those who want, need, and are capable of profiting from the instruction. It necessarily follows that high school students should be enrolled in vocational programs only after having been intensively subjected to accepted vocational guidance procedures which will have determined that individual students have:

    a. Appropriate aptitudes, vocational interests and personal and physical characteristics which will make success possible and probable.

    b. Vocational intent and a desire to satisfy their need.

    Vocational education conducted without regard for this principle constitutes a travesty in education and should not be tolerated. Administrators would do well to carefully examine enrollment policies in all vocational education programs.

3. Vocational education can successfully be given only in an environment which is a replica of the environment in which the student will subsequently work. This refers to the type of facilities and equipment, the nature of the instruction and the organization and management of the instruction. In other words every facet of vocational instruction should involve activities which are as near the real thing as possible. Equipment should be of the production type

which is used in industry as opposed to "home craft" varieties. Laboratory activities should involve real products which compare favorably with products being produced in modern industry. For example, building trades classes should be constructing real houses which will be sold or rented after completion.

4. Vocational education will be effective in proportion to the occupational competency of the teacher in the field in which he is teaching. There is no substitute for successful work experience on the part of the teacher. His teaching must stem from his ability to perform acceptably under actual circumstances in the occupational area in which he is teaching.
5. There is a minimum per capita cost below which effective vocational education cannot be given. If there is not sufficient fiscal ability to meet this minimum cost, vocational classes in question should not be attempted. The implication here is that vocational education is more expensive than general education and should not be judged by the same criteria. Administrators should recognize and apply this principle in determining which vocational programs are fiscally feasible in their school.

Industrial Arts and Vocational Education in Leflore County High Schools

Grade 10

The fact that mechanical drawing is universally defined as "The Language of Industry" places a value upon it which cannot be overlooked in vocational and industrial arts programs. For this reason, it is deemed necessary that it become an integral part of the total program.

It is recommended that basic elements of mechanical drawing be taught incidentally throughout the junior high school industrial arts program with specific emphasis being given to this area in the 10th grade. This emphasis should take the form of a full-unit course to be required of all students who will enter specific vocational programs in the 11th grade. The course should be open to all students in the 10th, 11th, and 12th grades who are not interested in vocational education but attach value to the course for other reasons. In this respect, it is suggested that separate sections be provided for each interest group.

Students having interests which cannot be satisfied by the vocational courses which are offered in the Leflore County Schools may elect to continue in industrial arts courses on the high school level. It is, therefore, recommended that advanced industrial arts courses be made available at the 10th, 11th, and 12th grade levels in the areas

of general woods, general metals, and general electricity and electronics (see schematic of total program, Figure 1, page 40). Special reference is made to electricity and electronics in the 12th grade as being an excellent course for academically talented students. The technical nature of this course should challenge the more mentally apt individuals.

It is assumed that students who are interested in specific vocational training will have made their occupational choice before or at the time they reach the 10th grade level. At this point they would schedule mechanical drawing as a preliminary to enrollment in the appropriate vocational program in the 11th grade.

Grades 11-12

Specific vocational day trade programs are normally designed to operate for two 9-month school terms involving 3 clock hours of instruction per day, 15 hours per week and 540 hours per term. The total instructional time during the two year period is 1080 hours. As a general rule the student receives two credits for each year or a total of four credits. During this two year period the student will also take two regular high school courses each year thus earning the usual four credits per year which will satisfy graduation requirements. It is strongly recommended that vocational day trade programs presently being offered in the two Leflore County High Schools be examined for the purpose of determining if

they are in line with the needs of students and are representative of occupational areas which offer employment opportunity to graduates from the program.

It is suggested that a full-fledged occupational study of areas served by the Leflore County Schools be made in an effort to identify areas of employment opportunity for high school graduates for an extended period of years. Information which results from such a study should serve as an excellent basis for determining which specific vocational education program should be continued and/or established.

Vocational Part-time Cooperative Education

It is suggested that vocational part-time cooperative training be made a culminating feature of the total vocational and industrial arts program of the Leflore County Schools. Such a program would provide an excellent opportunity for selected students to receive a superior type of educational experience "in the classroom and on the job", as a preliminary to fulltime employment after graduation from high school (see schematic of total program, Figure 1, page 40). If vocational part-time cooperative education is to be included as an integral part of the total program, it should be established in accord with guide lines which have been developed by the State Department of Vocational Education.

A paramount feature of the program would be departure from traditional requirements for part-time cooperative education classes which restrict student enrollment to specified

occupational areas. Such departure is in line with principles involved in the vocational act of 1963 which seeks to eliminate segmentation of vocational education services according to occupational lines and to encourage the principle of "occupational mixing".

Students to be enrolled should be carefully screened according to the degree of excellence they have achieved as participants in the industrial arts and vocational programs through the 11th grade, their possession of appropriate aptitudes and vocational interest, and their attitude and sincerity of purpose toward preparation for fulltime employment.

It is recommended that the program be confined to the 12th grade and that students be enrolled only after one year in the 11th grade day trade program or after having had two high school industrial arts courses. Exceptions to this rule would be students coming from other areas of the system such as business education and home economics who have achieved the same standard of excellence and possess the same personal qualities as recommended above. Final decisions on the part of students to enroll in the part-time cooperative program should be based on the results of full participation in vocational guidance opportunities which have been available to them.

C H A P T E R V

SUMMARY AND RECOMMENDATIONS

Summary

The overall purpose of this project was to develop an industrial arts and vocational education program for grades K-12 which would prepare people for living and working in a modernized agricultural and industrial economy. This problem was approached through the development of programs designed to meet the specific needs of the elementary, junior high school, and senior high school.

Elementary

The purpose of industrial arts in the elementary grades is to help the school do better what it is already doing. It must not be considered an additional course or a matter of making things. Industrial tools, materials, and processes should be used to enrich the teaching-learning process. Activities should stem from the subject that is being taught and should be used to reduce the level of abstraction often connected with education.

Junior High School

A prime function of the junior high school is to provide students with educational experiences which are

exploratory and pre-vocational in nature. Industrial arts in the junior high school should reflect this important charge.

The traditional project-centered industrial arts program no longer depicts industry. Industrial arts cannot accomplish its important pre-vocational and exploratory function if it does not adequately convey the modern concept of industry.

In the 7th grade the exploration of industry should be approached through the study of industrial crafts. Ceramics, plastics, non-ferrous metals and graphic arts are the areas recommended. The study of these crafts should be broad enough to provide a complete understanding of the industrial importance of each.

Occupational orientation should be an additional segment of the 7th grade program (see Figure 2, page 41).

Industrial arts in the 8th grade should be devoted to exploration of the major modern industries. Forest products, ferrous metals, electricity, and power are recommended for study.

The 9th grade program should have a two-fold purpose. The first semester should be devoted to an in-depth study of two of the areas explored during the 8th grade. Electricity-electronics and power are strongly suggested for this study. The second semester should be directed toward the exploration of all facets of industry and the nature of their interrelationships. This should be accomplished through the

organization and operation of a simulated industry.

Senior High School

The industrial education program in the high schools should provide opportunity for general education experiences in industrial arts and opportunity for vocational pursuits (see Figure 1, page 40).

Industrial arts should consist of mechanical drawing or general woods in the 10th grade, general metals in the 11th grade, and electricity-electronics in the 12th grade.

Vocational education should start with mechanical drawing in the 10th grade. In the 11th grade and 12th grade vocational day trade programs should be established on the basis of need which is identifiable in terms of employment opportunities for graduates. Vocational part-time cooperative training should also be available in the 12th grade.

Organizational Charts for Leflore County Schools

Figure 1 was developed to provide the reader with a graphic representation of the total industrial education program. This figure depicts the articulation between grade levels and the progressive nature of the program from grades K through 12.

Figure 2 illustrates the organizational structure of the 7th grade. Special attention is directed toward the provision for occupational orientation as an integral part of the organizational pattern.

ORGANIZATIONAL CHART FOR LEFLORE COUNTY PUBLIC SCHOOLS

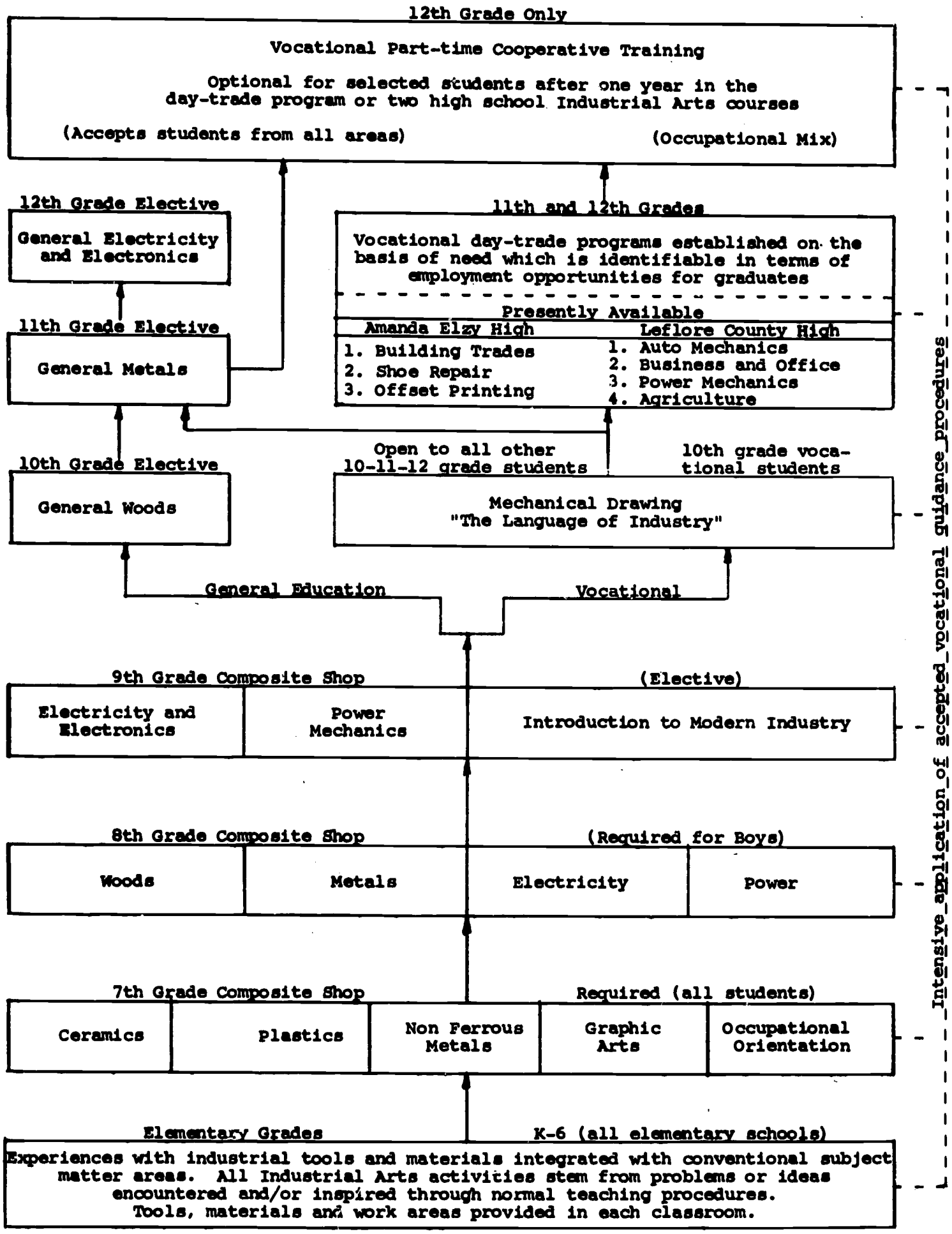

FIGURE 1

SUGGESTED ORGANIZATIONAL CHART FOR 7TH GRADE COMPOSITE SHOP

10 days	30 days	30 days	30 days	30 days	5 days	30 days	15 days
Orientation	Ceramics	Plastic	Non-Ferrous Metals	Graphic Arts	Ending the Course	Occupational Orientation 5 days devoted to each of the following occupational areas: 1. Business & Office Education 2. Distributive Ed. 3. Home Economics 4. Health Occ. 5. Teaching	This 15 days is to be properly allocated to holiday periods. If additional time is needed, take required days from orientation and/or ending the course.
	Plastic	Non-Ferrous Metals	Graphic Arts	Ceramics			
	Non-Ferrous Metals	Graphic Arts	Ceramics	Plastic			
	Graphic Arts	Ceramics	Plastic	Non-Ferrous Metals			

FIGURE 2

Recommendations

The initiation of a total industrial arts and vocational education program in the Leflore County School System is a pace-setting undertaking. The many facets of this program will require progressive and systematic implementation. Consequently, careful consideration should be given to the following recommendations.

1. All teachers and administrators should become familiar with the organizational chart shown in Figure 1, page 40.
2. The industrial arts program in the elementary schools should be expanded at the rate of two schools per year.
3. All elementary teachers should take I.Ed. 6713, Industrial Arts in the Elementary School, before initiating industrial arts activities in their classrooms.
4. In-service programs in metals, electricity, interpretation of modern industry and other areas of deficiency should be initiated for industrial arts instructors. These instructors should also receive an orientation to the occupations listed in Figure 2, page 41.
5. There should be an industrial arts consultant for

every 20-25 classrooms.* Provisions should be made for office and for other space deemed necessary.

6. The consultant should be responsible for tool maintenance and for the supplies inventory in the elementary classrooms for which he is responsible.
7. Intensive application of accepted vocational guidance procedures should permeate the entire school system as indicated in Figure 1.
8. The total program should undergo a continuous informal evaluation and remain flexible to conform with changing needs.
9. Provisions should be made for a yearly formal evaluation of the program.
10. All phases of the program recommended for the junior and senior high schools should be activated as rapidly as possible. The rate of activation will depend upon the ability of the Leflore County Schools to provide additional shop facilities, equipment and teachers.
11. A full-fledged occupational study of areas served by the Leflore County Schools should be made in an effort to identify areas of employment opportunity for high school graduates for an extended period of years.

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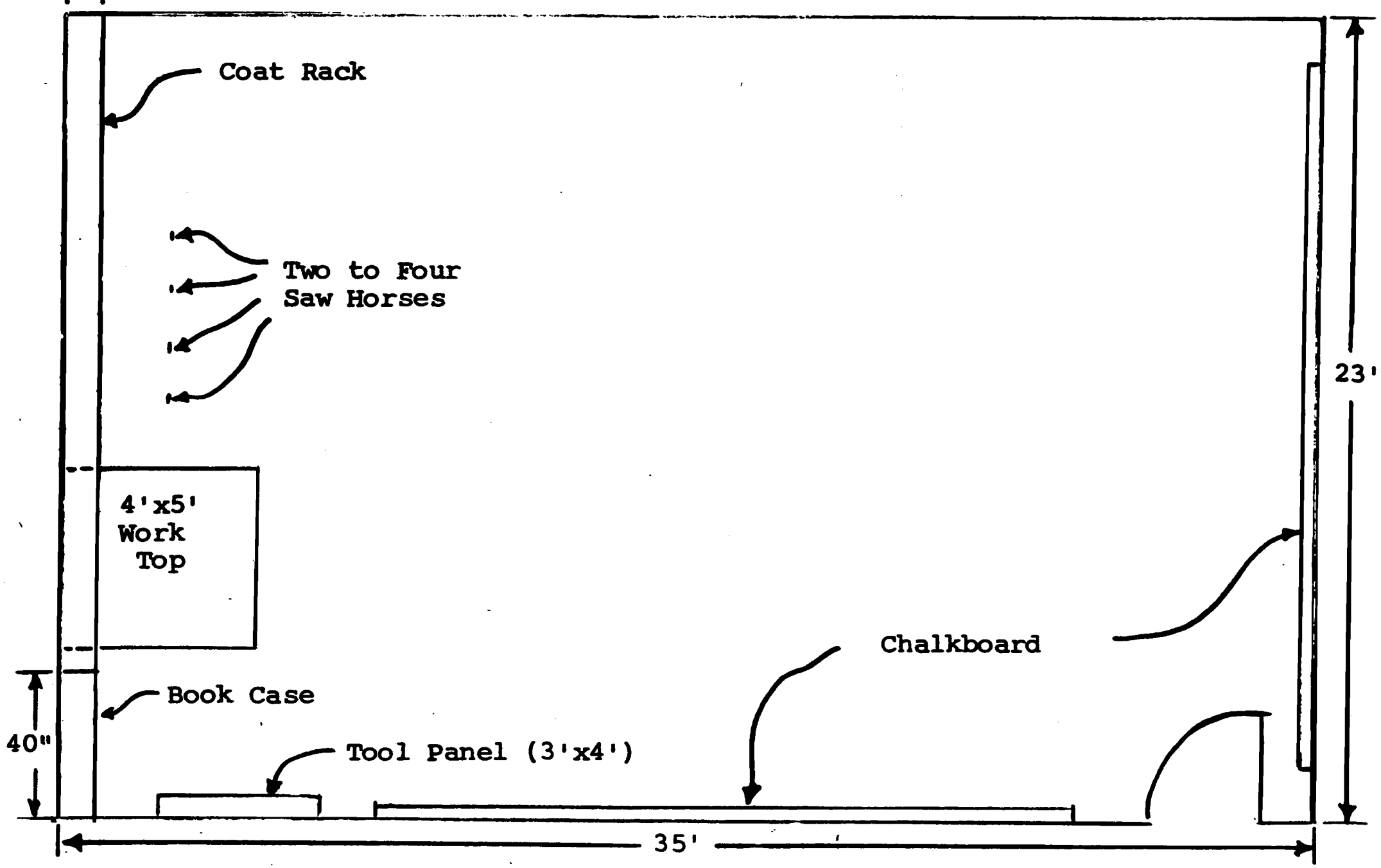
*Gerbracht, Carl, and Babcock, R. J. Industrial Arts for Grades K-6. Bruce Publishing Company, Milwaukee, 1959, p. 139.

APPENDIX A

ELEMENTARY CLASSROOM WORK AREA

ELEMENTARY CLASSROOM



APPENDIX B

PILOT PROPOSAL FOR

ELEMENTARY SCHOOL

PILOT PROPOSAL

Justification for Pilot Study in One School

To successfully implement the elementary industrial arts program in Leflore County, it was decided that a pilot study involving only one school would logically be the first step.

The following statements are offered as support for this decision:

1. This approach would provide an opportunity to make necessary modifications in the program before it is initiated on a county-wide basis.
2. Because of the large number of elementary teachers involved, it would be difficult to initiate a program of this magnitude by the beginning of the 1968-1969 school year.
3. Basic hand tools need to be available in each classroom to implement the elementary industrial arts program. Due to the sizable expenditure of funds required to equip all classrooms in the county, careful consideration must be given to the number, size, and type of tools which are to be used. A pilot program is necessary to determine the most economical expenditure of funds for tools.
4. A pilot program will also provide an opportunity to build a nucleus of enthusiastic teachers who will be beneficial in the county-wide implementation of the

program. These teachers can provide valuable assistance in further program expansion.

Teacher Education

It is proposed that a teacher education program be initiated. This program will provide the elementary teachers with the necessary background for utilizing industrial arts activities in their classrooms.

Phase one will be an in-service training program and phase two will be a graduate credit extension course.

In-Service Training (Phase One)

This educational program will be given during the Leflore County preschool workshop. This short intensive training program will be conducted by university personnel. Assistance will be provided by the elementary industrial arts consultant and the industrial arts instructor at the pilot school. The purpose of this training will be to instruct teachers in the proper use and care of the basic hand tools and to acquaint them with materials appropriate for use in the elementary school.

Graduate Credit Extension Course (Phase Two)

To give the elementary teacher a comprehensive understanding of elementary industrial arts content and method, an extension course will be offered. This industrial arts course will probably be taught once a week for 15 weeks. It

will carry three hours graduate credit and will be taught in Leflore County. This course, taught by university personnel, will be implemented at the earliest possible time. Ideally, elementary and industrial education personnel would be utilized in a team teaching situation.

Consultant's Role

The primary responsibility of the elementary industrial arts consultant should be concerned with the development of the pilot program. He should provide assistance in integrating industrial arts activities into the existing elementary curriculum.

Bill of Materials for In-Service Workshop

50 linear feet of 1" x 6" mahogany

100 #10 1½" flat head wood screws

1 quart mahogany water base stain

1 quart mahogany oil base stain

25 sheets fine garnet abrasive paper

10 sheets medium garnet abrasive paper

2 quarts Deft finish or other fast-drying natural brush type finish

8 1½" good-quality paint brushes

2 quarts Elmer all-purpose glue; or Presto-set (Wellwood) white glue

1 gallon lacquer thinner

2 3/8" reduced-shank twist drills.

APPENDIX C

REPORT BY HUNT

A Report Regarding

TECHNOLOGY FOR CHILDREN*

in the Leflore County Schools

Greenwood, Mississippi 38930

by

Elizabeth E. Hunt, Consultant
Technology for Children
Route 4 - Box 792
Marion, North Carolina

<u>The value of an elementary school industrial arts or "technology for children" program to the school and to the community</u>.

Every school owes each child the opportunity to develop his potential to the fullest. Human potential is not limited merely to dealing competently with the 3 R's. However, our schools have traditionally placed this limitation on what they attempt to do for the child. It is urgent that the school broaden its spectrum of opportunity for children, and thereby be able to feed into its community life and economy human beings who have fully developed their potential. The Leflore County School System in its move to develop a total industrial education program (K-12) is broadening opportunities particularly for young children to become more fully functioning, competent human beings who are a credit to themselves as well as their community.

Technology for children offers opportunities for

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*This term used to refer to the program being developed.

children to develop in these specific ways: autonomy, problem solving abilities, speaking, writing, and reading (through the use of technical activities as a base) a feeling of self-confidence and self-worth, the ability to work with others, and an interest in learning and in school. In a school system which has no law requiring the attendance of its students, it is all the more important for the schools of that system to provide the kind of learning program which will lure the child to school. Having the opportunity to deal with a wide variety of tools in the classroom lures children to school. This has been demonstrated over and over with children.

Another outcome of tool/material experiences is that when children have the opportunity to deal with tools and materials they often are able to identify with what adults do in their work. Children have the opportunity to discover their own likes, dislikes, interests and abilities with regard to the world of work.

Contribution to educational process.

Education is the institutionalized management of the learning process. Therefore, the job of the school is to enhance this learning process to the greatest degree possible. Learning depends on getting information through all of the senses from the surroundings. Traditionally in school, we have provided primarily verbal channels through which the child gets information, e.g. the teacher, the book, etc.

This severely restricts the amount of information to be gained from the environment. Adding tools and materials to the environment sets up problem solving situations. When children are allowed the freedom to interact or deal with these materials in both directed and non-directed ways, the cognitive, affective and psychomotor processes (represented in broad areas of the curriculum) can be developed.

The "Design Way of Thinking".

Design means to find a simple, direct solution to a problem. In other words, it is problem solving. The "design way of thinking" is a powerful way of thinking. In using the "design way of thinking", one begins with a definition of the problem. One asks, "What is the problem?" This is the first and most difficult step. It is also the most important step. Something as simple as changing one word in the definition can make possible a better solution. Some problems are more complex and criteria for solving these problems should be developed. For example, the problem of freezing cream. Criteria for solving that problem could be: something to hold the cream, something to hold the ice, a way to mix the cream as it is freezing, a way to insulate the cold unit from room temperature. One rarely, if ever, comes up with an ultimate definition. This is why problems are always subject to new solutions. This is why the "design way of thinking" is so exciting. Virtually all problems can be re-defined; and the better the definition, the

greater the possibilities of a more adequate solution.

In technology for children, the approach advocated is that of using the "design way of thinking". This means that, for example, instead of children replicating solutions to problems such as freezing cream and thus constructing an ice cream churn, they would be looking at what the problem really is and developing solutions for the problem as they have defined it. In the case of the ice cream freezer, one solution developed was: something to hold the cream—a plastic bag; something to hold the ice—a larger plastic bag; a way to mix the cream as it is freezing—change the position of the freezer every two or three minutes; a way to insulate the unit from room temperature—two bath towels sewn to form a bag-like container.

The teachers in the pilot school (Leflore County School System) were introduced to the "design way of thinking". The problem introduced was, "how to hold eight books on the top of a desk in such a manner as to be used conveniently". Although the definition developed was not a sophisticated one, these teachers demonstrated an understanding of the nature of the "design way of thinking", entered into the spirit of defining the problem, and appeared to be ready to translate criteria into reality. This approach to having teachers construct or make something does not yield results as quickly in terms of a "product". However, the understanding and the openness for creating that this approach develops is more than worth the additional time it takes to get to

"products", "tool skills", and "techniques for handling tools". This approach also sets the stage for helping children (who already have an openness in dealing with tools and materials) develop their own ideas and thus creative abilities. The value to be derived from the problem solving approach can be summarized in this way: "It helps children develop their own creative problem solving abilities. 'Products', 'tool skills' and 'techniques for handling tools' develop more slowly and take a secondary role; but they will be achieved".

Since a set of tools will be provided for each classroom of the pilot school in Leflore County, a time for children to explore what the tools can be should be provided. This is the first stage in developing the "design way of thinking". Though considered "non-productive", it is necessary in order to become acquainted with the properties of the materials and with what each of the tools can do. Teachers should not feel uncomfortable when children are exploring tools and materials on the basis that they have not structured the learning situation. Children learn much through discovery. Problems are inherent in dealing with tools and materials as they explore the nature of the materials. One six year old in attempting to drive a nail through tempered masonite could not get the nail to go through. On failing to drive it through by hitting the head of the nail, he turned the piece over with the nail still in and proceeded to hit the masonite. The nail came through.

Teacher problems.

When the elementary classroom teacher assumes the major responsibility for implementing a program of technology for children within the self-contained classroom, certain problems arise more frequently than others. First, tool/material media are unfamiliar to most elementary teachers. They feel insecure about using them. This feeling of insecurity is extended further in that they do not know how to guide the learning of young children using this media. They feel they do not know enough about the tools or cannot handle them well enough to "teach" children how to use them. Further, they are not quite sure how this program should be "administered" in the classroom. Frequently asked questions are: "How many hours per day?", "How many days per week?", "How many children work with the tools at one time?". There are no pat answers to these questions. However, there are some guidelines for obtaining answers as children explore the tools.

One guideline is to observe the children when they are given the opportunity to explore freely. What kinds of things do children attempt to do with the tools? Cut a board? Pound a nail? This is typical of the first stage children go through in handling the tools in a non-directed situation. Do they put two or three pieces together in a manner that suggests an item to them and then attempt to complete whatever has been suggested? Example: Two pieces of wood the

children have fastened together suggest the body and wing of an airplane; they then add the tail. A guideline in connection with this type of exploration is not to become overly anxious about the amount of time the child spends in this activity, particularly in terms of the visible results. As long as the child appears to be satisfying his own curiosity and is not hurting himself, others, or the tools, the exploration is likely to be legitimate in terms of what the child will learn about the tools and materials. One indication that the child may be ready to give some thought to "making something" is when he begins structuring his own exploratory activity in terms of a "product". (It is suggested, particularly in kindergarten and first grade, that scrap wood and other scrap material be used for exploration.) One problem most teachers encounter with regard to this approach is that they find it difficult to relinquish their roll of directing all of the activity. They find it threatening to allow for the non-directed activity of children.

The guideline of having children initiate their own activities applies to all grades K-6. The teacher will be of greatest assistance if she can consider herself a source of help for problems the children encounter in the activities they have initiated. The extent to which this can be done depends upon the style of the teacher. The teacher has the right to begin where she is in managing a class and develop toward working this way with children. If the teacher is suddenly asked to change her way of operating with children,

her discomfort in the situation is likely to negate the effects of using this approach.

The teacher will encounter these technical problems: securing materials, having materials pre-cut, identifying appropriate materials, repairing tools, and obtaining petty cash for materials needed right away. She will need outside reference materials and information, assistance in classroom organization, and an awareness of safety. It is necessary for her to realize that the curriculum is inherent in what the children are doing and be able to use the children's activities as a base for developing language, counting, measuring, etc. In addition, she needs to have in-service workshops to help solve problems that occur during the school year.

<u>The Administrator's tasks and problems</u>.

An administrator in charge of a school where technology for children is being implemented should make the following budget provisions:

1. An annual allocation for a stockpile of commonly-used materials.
2. A petty cash fund for materials which cannot be anticipated. (Not being able to obtain materials when special needs arise can seriously deter the benefit to be derived from a learning episode.)

The administrator should establish both policies and procedures for purchasing materials and/or securing materials

from the stockpile. The administrator (especially in a pilot program) should meet often with his teachers to ascertain what the problems are. This should be done in an atmosphere of mutual support and helpfulness in order to provide a chance for the teacher to air her problems openly with the other teachers without fear of being criticized either for having the problems or not being able to solve them. The administrator should use these meetings to become thoroughly aware of the problems and thus be able to communicate them to those in key positions of implementing the program in other schools. The attitude of, "Let's try this out, discover what the problems are and see how we can solve them together", will go a long way toward the successful implementation of the program.

The administrator should also be prepared to explain the program to parents. If a thoroughgoing two-way communication exists between administrator and teachers, conflicting explanations of the program to parents will be avoided.

Parents' reactions.

Possibly one of the primary concerns parents will have when children use school time for working with tools and materials is that valuable time is taken from learning to read, write, spell, add, etc. Parents might also interpret the program as one designed to "make carpenters or mechanics out of the children". Parents of lower socio-economic status may be particularly sensitive about this if they feel the

school is providing something less for their children relative to "middle class" values. When a program of technology is initiated, meetings with parents (on some regularly-scheduled basis) for better understanding of the program is advised.

One of the best safeguards against parent misunderstanding about the purpose and effectiveness of such a program is for the teachers to understand how the program enhances the total development of the child—language and otherwise. It has been found as a result of such a program, the child wants to attend school and finds "success" with tools and materials. This is a better base for learning other things and gaining a feeling of confidence and self-worth.

Assuring appropriate "success" on the part of all pupils.

"Success" is an adult oriented word. Success is usually measured in terms of expectations. Children are likely to take on challenges they feel they can handle or cope with and, thus, in a sense, feel "success". Many times they explore and discover not for any particular goal or outcome. Therefore, the "success" or "failure" of the venture does not exist. However, when adults have expectations of children and children sense they should meet them and are not able to, a feeling of "failure" is likely to develop. This feeling can be a detriment to the entire learning process. The better approach is to be appreciative of what

children do accomplish on their own, and provide continued support for whatever they undertake to do.

How important is "pre-vocational" interest at the elementary school level?

In order to evaluate the importance of any "pre-vocational" interest at the elementary school level, the following should be considered. The child is a generalist. He is initially interested in anything and everything. He gradually becomes more selective. Those areas of interest he selects are usually the areas in which he has developed a greater depth of competence. Also, children are ego-centered. That is, they want to find out what they can do and are only secondarily, if at all, interested in getting information about what others do in the "world of work". Therefore, pre-vocational programs must do more than merely provide information about work. They must afford opportunity for first-hand experience.

Since children do have broader interests initially, it is difficult to predict which of these interests may be important in terms of permanency. All pre-vocational interests are important if they lead to broad exploration and first-hand experiences. For the exploration of many interests provides a better base for an intelligent decision regarding one's vocation.

APPENDIX D

IN-SERVICE WORKSHOP

SCHEDULE OF EVENTS

SCHEDULE OF EVENTS

In-Service Workshop

Schedule of Events

Wednesday, August 28, 1968

8:30 - 8:45 Orientation

8:45 - 9:30 Show film (A B C of Handtools)

9:30 - 9:40 Break

9:40 - 9:55 Show project and have teachers select tools needed

9:55 - 11:30 Lab Activities (10 min. break at 10:30)

1. Selection of materials
   a. Staff - types and use of stock
   b. Student - select stock
2. Demonstrate procedure steps 1-5 on project plan sheet
3. Teachers perform steps 1-5
4. Creative design of book support by advanced student
5. Discuss activities for the following day and make assignment.

Thursday, August 29, 1968

8:30 - 9:00 Seminar (discuss assignments and have question and answer period)

9:00 - 9:20 Demonstrate procedure step 6 on project plan sheet

9:20 - 9:30 Break

9:30 - 11:30 Lab Activities (10 min. break at 10:30)

1. Teachers perform step 6
2. Demonstrate procedures steps 7-10 on project plan sheet
3. Teachers perform steps 7-10
4. Discuss activities for the following day and make assignment.

Friday, August 30, 1968

8:30 - 9:00 Seminar (discuss assignment and have question and answer period)

9:00 - 9:30 Demonstrate procedure step 11 on project plan sheet

9:30 - 9:40 Break

9:40 - 10:30 Lab Activities

1. Teachers will perform step 11
2. Staff will demonstrate use of tools not utilized on book holder.

10:30 - 10:40 Break

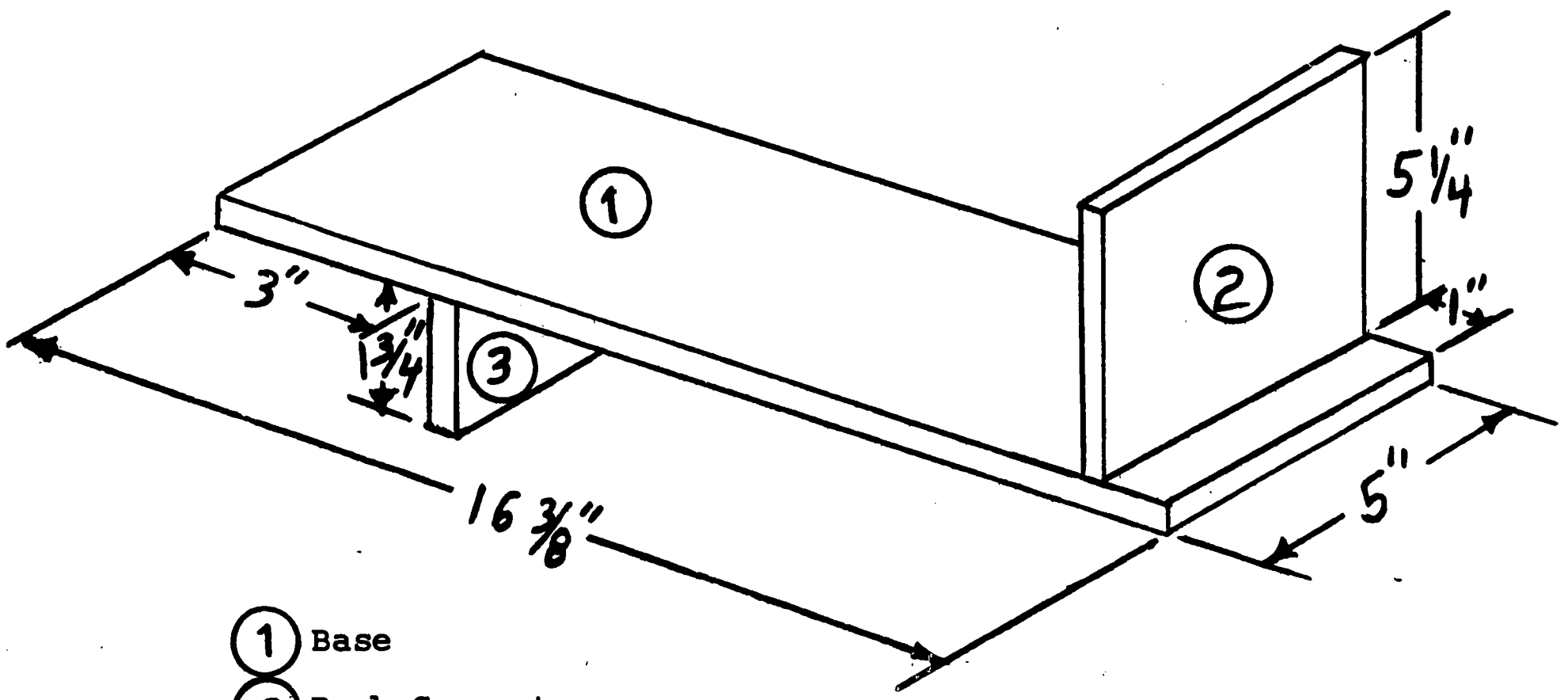
10:40 - 11:30 Group Activities

1. Small group discussion - Utilizing Industrial Arts Activities in Elementary Curriculum
2. Sharing of group ideas
3. Concluding activities.

APPENDIX E

PROJECT PLAN SHEET

BOOK RACK



(1) Base

(2) Book Support

(3) Riser - 8 degree angle on top

Note: All lumber 3/4" thick.

List of Tools

6" try square
10-point crosscut saw
5" C clamp
24" steel bench rule
block plane
File, surform
1/4" portable electric drill
9/64, 13/64 and 3/8" drills
sanding block
6" screw driver
Rags
1½" paint brush

Bill of Materials

1 piece of mahogany 3/4" x 6" x 30"
4 screws, wood (#10 1½" flat head)
2 sheets of abrasive paper (1 sheet fine, 1 sheet medium)
glue, white liquid
stain, oil
finish, Deft
Lacquer thinner

Plan of Procedure

1. Select materials (mahogany stock)
2. Square one end of stock
   a. Mark with try square
   b. Cut with crosscut saw
   c. Smooth with plane
3. Plane board to proper width
   a. Mark width with steel bench rule
   b. Plane to width with block plane
4. Layout and cut base
   a. Use steel bench rule to make measurements
   b. Use try square to draw lines
   c. Clamp in vise or with C clamp
   d. Cut with crosscut saw
   e. Smooth with plane
5. Repeat step 4 for book support and riser
6. Mark and drill screw holes in base, book support and riser
   a. Position riser on base and drill pilot holes with 9/64" drill
   b. Position book support on base and drill pilot holes with 9/64" drill
   c. Drill shank holes in base and riser with 13/64" drills
   d. Countersink base with countersink and riser with 3/8" reduced shank drill
7. Trial assembly
   a. Assemble book holder (with screws only)
   b. Check all parts for proper fit.

c. Disassemble and make corrections for proper fit.

8. Sand all parts (use sanding block)

   a. Use medium abrasive paper for rough sanding

   b. Use fine abrasive paper for finish sanding

9. Final assembly

   a. Use glue on all joints

   b. Secure with screws

   c. Clean off excess glue

   d. Sand if needed

10. Stain

   a. Apply stain

   b. Wipe

   c. Sand if needed

11. Finish

   a. Apply wash coat (optional)

   b. Sand lightly

   c. Apply Deft.

APPENDIX F

COURSE DESCRIPTION FOR

INDUSTRIAL ARTS IN THE ELEMENTARY SCHOOLS

INDUSTRIAL AND OCCUPATIONAL EDUCATION

New Course

IED 4713/6713. Industrial Arts in the Elementary School. (3)

Three lectures. Concepts and methods of enriching elementary curricula by integrating the use of industrial tools and materials with teaching techniques presently employed at the elementary level.

APPENDIX G

COURSE OUTLINE FOR

INDUSTRIAL ARTS IN THE ELEMENTARY SCHOOL

MISSISSIPPI STATE UNIVERSITY

DEPARTMENT OF

INDUSTRIAL AND OCCUPATIONAL EDUCATION

IED 6713

INDUSTRIAL ARTS IN THE ELEMENTARY SCHOOL

3 Semester Hours

COURSE OUTLINE

COURSE OUTLINE

Introductory Statement

This course in Industrial Arts for the Elementary School, IED 6713, will carry 3 semester hours graduate credit. It will meet three hours per week for 15 weeks.

The course is designed for elementary teachers who wish to enrich their curriculum by integrating industrial arts activities with methods presently employed at the elementary level. The course may also be taken by industrial arts teachers who desire to work with elementary teachers in this endeavor.

Course Aim

The aim of this course is to provide an opportunity for teachers to develop methods and techniques which will reduce the level of abstraction presently associated with many learning experiences in the elementary school. This enrichment process will be accomplished through the use of industrial tools, materials, and processes.

Course Objectives

The course aim will be satisfied through the following objectives:

1. To develop a sound philosophy concerning the need, value, and proper implementation of industrial arts activities in the elementary school.

2. To develop a measure of skill in the use of industrial tools, materials and processes.
3. To develop concepts and techniques for the utilization of tools and materials by elementary students in individual and group activities.
4. To help teachers enrich their curriculum through industrially-oriented problem-solving activities stemming from conventional subject matter areas.
5. To develop ways and means of introducing students to the world of work through the use of industrial tools and materials.

Lessons

Orientation

Philosophic Basis

Design Analysis Process

Tool Introduction

Basic Skills

Individual Activities

Graphic Representation

Investigation of Materials

Small Group Activities

Resource Materials

Class Organization

Large Group Activities

Autio Visual Presentation

Mass Production

Evaluation.

APPENDIX H

CHAPTER V OF NDEA REPORT

INTERPRETATION OF MODERN INDUSTRY

(National Institute Held at

Mississippi State University in 1968)

Chapter V

SUMMATION OF LABORATORY ACTIVITIES

The change from making individual products to mass production by assembly-line techniques prevails in today's modern industry. Interpretation of modern industry in the classroom is one of the most important objectives of industrial arts. An effective means of conveying this industrial interpretation to students is by teaching a unit on industrial organization and production. During the institute, the class simulated an industrial organization and assigned each participant a part to play in this industrial structure. Each participant learned the basic structure of an industrial organization and acquired a knowledge of the mass production process.

Two and one-half hours daily were devoted to organizing an industry and producing a marketable product. Involving the participants in an atmosphere similar to an industrial organization provided them with an opportunity to gain meaningful knowledge about modern industry. This involvement should enable the participants to relate the knowledge gained to their industrial arts students.

Objectives of Mass Production

A unit on industrial production should be an integral part of an industrial arts program. The following objectives representing the aims of mass production in industrial arts

were developed by the participants.

1. To develop an understanding of how industry organizes men, materials, and tools for product development, production, and distribution.
2. To urge students to be inventive and to provide an industrial setting for problem solving.
3. To develop an understanding of mass production, its values, and its place in our society.
4. To develop an understanding of a free enterprise system by means of advertising, marketing, and selling.

Proposals to the Administration for Including Mass Production in Industrial Arts

In some cases, administrators object to the idea of organizing a class into a mock industry. A few administrators feel that the routine schedule should not be disrupted by including innovative ideas which require much classroom time. To some administrators, using a school-sponsored activity as a means for making a profit seems unethical.

During the institute, four proposals for including mass production as an integral part of the industrial arts program were prepared by the participants. These proposals will be used by the participants to inform their administrators of the need for mass production in their industrial arts programs. See Appendix H.

Selecting the Board of Directors

In the establishment of an industry, a group of people, usually the ones who finance the industry, meet in an attempt to discuss major problems. After major difficulties are resolved and decisions reached, policies pertaining to the industrial organization are formed along with the hiring of key personnel who help in organizing the industry.

In the institute, one participant was chosen by each of the four groups to serve as a board member. One of the board members was chosen to act as the chairman. Some of the major concerns of the board were: naming the industry, incorporating, policy making, and selecting a plant manager and a personnel director. Policies developed by the board are presented in Appendix I.

Selecting a Product to Mass Produce

The selection of a product to mass produce is one of the first phases of involving the industrial arts class in a mock industry. Many factors are involved in the selection of a product which will ultimately be mass produced. Such factors as market value, cost, skills, equipment, materials, storage, time, and class enrollment must be considered. Also, thought should be given to whether or not a better understanding of industry will evolve as a result of the manufacture of the product selected.

The objective of an industrial organization within a

school is not to mass produce a product per se. Through this activity, the student should gain a better understanding of the materials, problems, tools, and processes of industry.

The institute staff outlined a set of limitations for the item to be mass produced by the participants. Considering these limitations, each participant was asked to prepare a set of drawings for an item which he believed could be mass produced.

From each of the four work groups, two designs were chosen. These designs were then studied by the class. During the design study, a design analysis was made of each drawing. The class was then asked to vote on the design which would ultimately be produced by the institute participants. Some of the proposed designs and the design finally selected can be found in Appendix J.

Financing the Product

To simulate an industrial situation, 50 per cent of the manufactured products were financed by the participants. The mass-produced products were sold to staff members and other university personnel. After completing production, the products were delivered to buyers, and dividends were awarded to stockholders according to the amount of stock purchased.

Plant Organization

The success of an industry largely depends on its

organizational structure. An organizational chart is used to implement this structure. The complexity of this chart depends upon the size of the industry and the nature of the products manufactured. After the organizational chart is developed, it is then necessary to hire personnel to fill the various positions.

To simulate an industrial structure in the institute, the plant manager and the personnel director were chosen by the board of directors. Other key personnel were in turn selected by the plant manager and the personnel director. Employment application forms, secured from industry, were given to the participants by the personnel director. The information acquired from the employment forms helped in placing applicants in the various jobs.

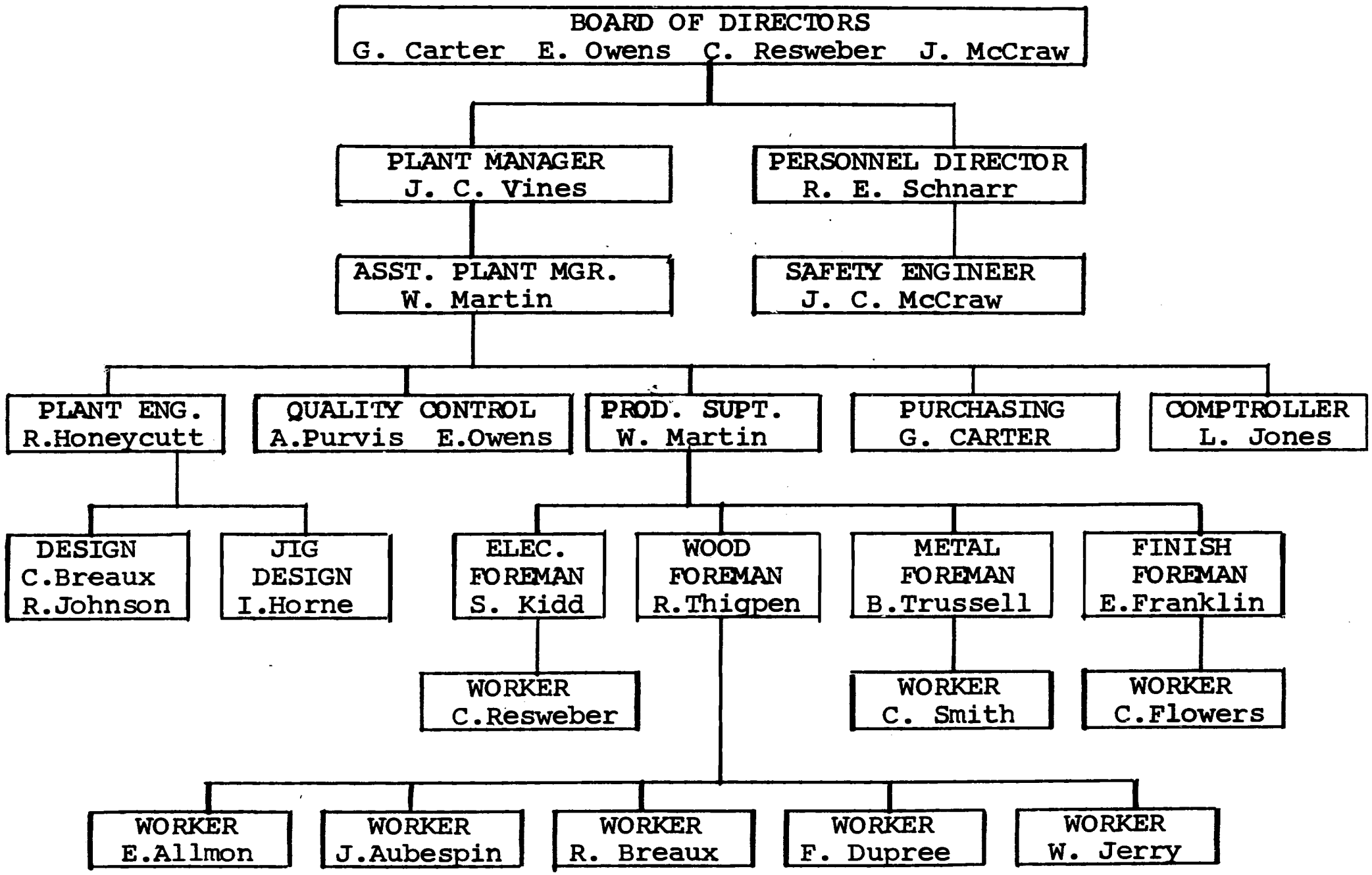
Prior to making job assignments, an analysis of the product has to be developed by the engineering department (see Appendix K). The product analysis was in turn used to determine personnel needs indicated in the organizational chart shown on the following page.

Committee Assignments

Prior to production, committees were established to resolve many production details. Each participant was assigned to one of three committees--engineering, production, or business. Each committee had a particular function during the pre-production phase.

The engineering committee consisted of the head

MSU INDUSTRIES INC. ORGANIZATIONAL CHART



engineer, the production engineer, the drafting department, and the set-up department. The function of this committee was to make detailed drawings, construct an organizational chart, make an analysis of the proposed product, and make the necessary jigs and fixtures. Moreover, it was this committee's responsibility to plan material flow charts, route charts, and the plant layout.

The production committee consisted of the production manager, foremen, and operators or workers. During the preplanning stage, this committee functioned as a research team with the responsibility of making the pilot product.

The third major committee was business which consisted of the comptroller and the purchasing agent. During the preplanning phase, this committee sold stock, advertised, made sales, and purchased materials.

Each of the three major committees functioned simultaneously for approximately nine hours. After all committee work was performed, each committee reported the results of their activities to the total group. Also, the pilot product was presented by the production committee. Final approval was given for the product and production was ready to begin.

Manufacturing the Product

The production chart, which was prepared by the personnel and engineering departments, was explained to the class by the personnel director. Job assignments, which were made by the personnel director were included on the organizational chart.

After a thorough explanation of the organizational structure by the management staff of the mock industry, the assembly line was then established with each participant performing a particular job.

At this point, all activities were centered around the product being manufactured. As difficulties arose, the managerial staff suggested solutions to the problems. Consequently efficiency in work and in quality was maintained on the production line. The following paragraphs describe the departments, positions, and jobs within the industrial organization.

The plant manager was in charge of the total plant operation. By working directly with the department heads, he was able to correlate the operations of the plant, thus adding to a smooth flow of materials and operations during production. The plant manager also maintained the organizational structure and made decisions for the company.

The personnel director was responsible for staffing the plant. Positions and jobs were assigned after participants had filled out application forms. The personnel director developed such forms as time cards, job description forms, and requisition forms.

With the help of the comptroller, the personnel director developed a pay scale and prepared the payroll, taking into consideration taxes, social security, and other deductions. Personnel relations and publicity for the plant also were the responsibilities of the personnel director.

As in every industrial organization, safety proves to be

an important factor. The institute's safety director formulated rules and regulations for the plant personnel to use in performing their various duties. A study was made by the safety director to locate hazardous and unsafe practices which existed in the plant and then developed means to eliminate these practices. Information sheets were given all employers and employees by the safety director's office (see Appendix L) Periodic checks by the safety director were made to see that these rules and regulations were carried out. A variety of motivating devices were used to encourage safety.

The comptroller of the industry was responsible for the financial business of the organization. His responsibilities included the preparation of the financial statements and cost schedules (see Appendix M). Selling stock, selling the products, and delivery of the products were the joint responsibility of the comptroller and the purchasing agent.

The purchasing agent had the responsibility of securing the material needed to manufacture the products. Requisitions from the various departments were sent to the purchasing department. Supplies were let for bids and later purchased. Some supplies had to be purchased from other localities because needed items could not be purchased locally. A process inventory control chart was developed by the purchasing agent. The purpose of this chart was to show quantity ordered, date ordered, date received, and delivery period of each set of materials (see Appendix N).

The duties of the quality control department were to

insure that the manufactured product met standards and specifications. The standards were defined before procedures for the construction of the product were set up. Other duties of the quality control department were as follows: set up quality check points throughout the plant, determine the best use of raw materials, reject all products that did not meet the specifications and make sure all rejects were corrected before they were accepted.

A normal curve chart which was used to check one part for tolerance is shown in Appendix O. This chart was used to determine quality for a specific piece of stock.

The engineering department was responsible for designing and solving problems related to the manufacture of the product. This department began work by developing drawings which were later printed on a blue-line printer. In conjunction with the production department, the assembly line was set up and route charts developed. Other pre-production performances of the engineering department were: developing a flow chart, designing stock certificates and company trademarks, and drawing other charts and graphs. See the following page for an example of the stock certificates used.

The engineering department studied various means to help improve and increase production. Such means as careful observation, discussions with the production manager and other department heads, and motion and time study charts helped to facilitate production. As a result, a process flow chart (chart to balance the flow of materials from one operation to

No. 1 Shares 1

M S U INDUSTRIES, INCORPORATED

STOCK CERTIFICATE

This certifies that Elvin Franklin, Jr.

is the owner of One (1) fully paid and non-assessable common shares of - - - - - -$1.00- - - - - value each of M S U Industries, Inc., transferable on the books of the corporation in person or by duly authorized attorney upon surrender of this certificate properly authorized.

In Witness Whereof, the said corporation has caused this certificate to be signed by its duly authorized officers and sealed with the seal of the corporation.

This 18th day of July, A.D., 1968.

/ss/ Ernest A. Owens
President of the Board

Corporation Seal

/ss/ Carlyle F. Resweber
Board Member

another) and a Gantt chart were developed. The Gantt chart was used to determine order and delivery dates of materials (see Appendix P). The time study also helped determine the beginning and ending dates of production.

Setting-up was also the responsibility of the engineering department. Additional duties of this department were to design and construct jigs, fixtures, and other holding devices. These devices proved to be vital for increasing production and for the standardization of parts.

Jigs, fixtures, and other holding devices aided the following operations: drilling, mortising, shaping, routing, cutting, and assembling. There was a total of 10 devices used for improving production. There were as follows:

1. Device to mortise 1-1/4" x 1-3/4" x 1/2" hole in base for inserting shaft into base.
2. Device to drill 3/8" hole through side of base for cord insertion.
3. Device to hold shaft and handle in place to drill hole in side of shaft for pivot of handle.
4. Device to drill hole in center of mortise in base.
5. Device to hold tank in place for assembling on base.
6. Device to regulate lateral movement of the shaft when mortising for handle anchorage.
7. Device to hold handle when drilling 1/8" hole for beaded chain.
8. Device to hold shaft when drilling 3/8" and 3/4" hole through center of shaft vertically.

9. Device to hold shaft and spout when assembling shaft and spout.
10. Device to hold blanks for mortising out tank.

The production department was directly responsible for the construction processes. This department was supervised by the production manager who was responsible for regulating production parts, determining performance of production workers, working with engineering to improve production, establishing lines of communication between workers and top management, and keeping a production chart of parts produced.

The production department was divided into the following areas: The machine and assembly area, the electrical area, and the finishing area. A foreman in each of these areas was responsible for direct supervision, writing job descriptions, training employees, directing flow of materials, and making requests for needed supplies and equipment.

The machine and assembly area was responsible for shaping and assembling parts. Eight machines and nine assembly operations were utilized. An example of a route chart used in the machine area can be seen in Appendix Q.

The electrical area was divided into two parts: a sub-assembly and a final assembly. In the sub-assembly, lamp sockets, nipples, and cords were assembled. In the final assembly, the sub-assembly was attached to the product.

The finishing area was responsible for obtaining the proper exterior appearance of the product. A route chart developed for this area can be seen in Appendix R.

Each worker in the three production areas was responsible for diligent and efficient work, for safe performance at his work station, for care in using tools and equipment, and for making suggestions for product improvement.

Closing the Industry

At the close of the laboratory activities, products were delivered and dividends awarded. The stock owners received dividends in accordance with the number of shares of stock purchased.

A follow-up study and discussion of the planning, production, purchasing, and selling phases were conducted. During this discussion period, each department and participant gave an account of the experiences encountered during production.

APPENDIX I

ADDENDUM TO PROPOSAL NO. 000076

ADDENDUM TO PROPOSAL NO. 000076

Request:

To include a maximum of seven industrial arts instructors and one industrial arts supervisor from the Leflore County, Mississippi, School System as participants in the proposed 1969 Summer Program (presently, Leflore County employs seven industrial arts teachers).

Added Cost:

None

Reasons:

Leflore County school officials have requested that the Industrial and Occupational Education Department at Mississippi State University develop a composite industrial education program for grades one through twelve and for adult education. This Mississippi delta county has a high drop-out rate. A noticeable decrease in attendance is evident in the second year of school participation. Leflore County also has a very high percentage of socially and economically deprived families. (It has been reported that 7000 of the 8000 students in the county schools come from Negro families.)

Allowing the Leflore County teachers and their supervisor to participate in the proposed 1969 institute will strengthen their orientation toward introducing students to the industrial world of work. This would be a vital step toward implementing the total industrial

education program desired by this county school system.

In the elementary grades, the students would receive a basic introduction to the world of work. In the junior high school, the students would have the opportunity to explore various industrial areas in composite shops. The next educational phase would take the students through the interpretation of modern industry including the various elements of industrial organization, production and distribution. This is the phase that would be studied in the proposed 1969 summer program. The students' exposure to the industrial world of work would be continued through a high school vocational program.

Allowing the Leflore County industrial arts teachers to attend the 1969 institute is a necessary step in implementing this total industrial education program.

The Leflore County school administration is definitely in favor of this proposal change which would make it possible for their industrial arts teachers to attend the institute.